

## \* NOTICES \*

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A bibliography

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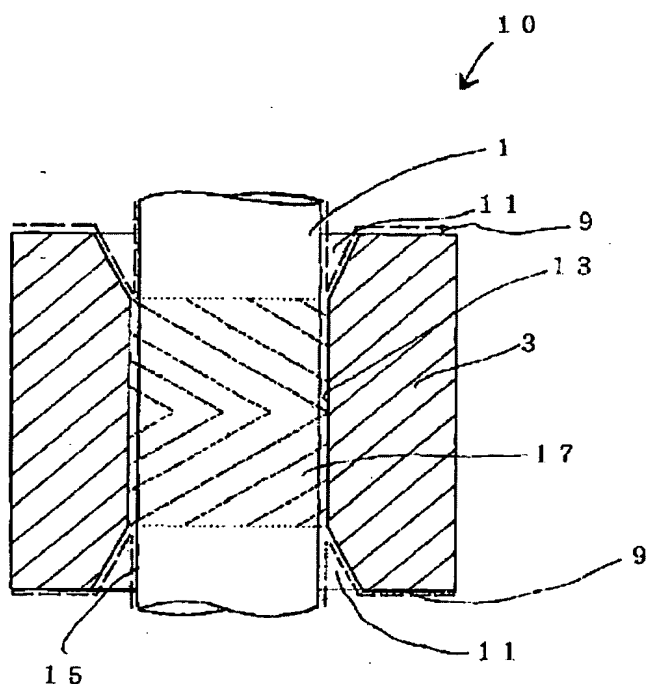
# An epitome

## (57) [Abstract]

[Technical problem] When performing oil-repellent processing to liquid bearing equipment, since the oil repellent agent is transparent and colorless, it is difficult to check about the existence of spreading to a coated member with the naked eye.

[Means for Solution] An art of an oil repellent agent of liquid bearing equipment characterized by a color coupler being added by said oil repellent agent in an art of an oil repellent agent which forms a layer of an oil repellent agent in liquid bearing equipment.

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## CLAIMS

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[Claim(s)]

[Claim 1] An art of an oil repellent agent of liquid bearing equipment characterized by a color coupler being added by said oil repellent agent in an art of an oil repellent agent which forms a layer of an oil repellent agent in liquid bearing equipment.

[Claim 2] Liquid bearing equipment with which a layer of an oil repellent agent which added a color coupler is formed in liquid bearing equipment.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] Especially this invention relates to the oil-repellent processing for preventing the outflow of a lubrication fluid in bearing of the hydrodynamic bearing equipment which has a dynamic pressure slot at least in one of the two of a shaft or a sleeve about liquid bearing equipment and the liquid bearing equipment used for information machines and equipment, and sound and an image machine dexterous spindle motor in more detail.

[0002]

[Description of the Prior Art] As shown in drawing 3, it has conventionally the shank material 101 which can rotate freely relatively to the sleeve member 103 and the sleeve member 103, and the radial side dynamic pressure generating slot 107 is established in either the inner skin of the sleeve member 103, and the peripheral face of the shank material 101, and the liquid bearing equipment 100 with which the gap 115 and the dynamic pressure generating slot 107 between the shank material 101 and the sleeve member 103 are filled up with the lubrication fluid is used for it.

[0003] In order that lubrication fluids, such as an oil with which the gap 115 formed by the peripheral face of a shaft 101 and the inner skin of a sleeve 103 was filled up, might prevent leaking according to the centrifugal force generated by rotation, oil-repellent processing had been performed using the transparent and colorless oil repellent agent. Moreover, after usually diluting an oil repellent agent with the production process of oil-repellent processing using an volatile high diluent in order to apply an oil repellent agent to homogeneity thinly, the oil repellent agent was applied to a periphery called the end face 109 and the taper section 111 of the radial bearing section 113 or the sleeve member 103.

[0004]

[Problem(s) to be Solved by the Invention] However, the conventional oil-repellent art has the following troubles. - When the oil repellent agent was applied to the location which must not be applied, or when applying to a portion with a detailed coated member, since the oil repellent agent is transparent and colorless, it is difficult to check the existence of spreading with the naked eye. - the liquid of the case where an oil repellent agent is applied in large quantities, or its oil repellent agent -- when who etc. arises, since the oil repellent agent is transparent and colorless, it is difficult whether the oil repellent agent was applied by the coated member throat top, and to distinguish. - Since [ that volatility is high ] the diluent usually used for the top where an oil repellent agent is transparent and colorless in order to dilute has early evaporation, when the oil repellent agent diluted with the cotton swab etc. is applied, it makes the check of the existence of spreading much more difficult.

[0005]

[Means for Solving the Problem] In order to solve the above-mentioned trouble, suppose that a color coupler

adds this invention to said oil repellent agent in an art of an oil repellent agent which forms a layer of an oil repellent agent in liquid bearing equipment. When performing oil-repellent processing by this invention to liquid bearing equipment, the condition of having been applied can be checked with the naked eye.

[0006]

[Embodiment of the Invention] In the oil-repellent processing for preventing the outflow of a lubrication fluid in bearing of the liquid bearing equipment which has a dynamic pressure slot at least in one of the two of a shaft or a sleeve, the oil repellent agent by which the color coupler was added is used for this invention.

[0007] What contains the thing or color which has fluorescence as a color coupler is used. In addition, when using the oil repellent agent which mixed the material of fluorescence, it is desirable to perform spreading under ultraviolet-rays light.

[0008]

[Example] Hereafter, the example of this invention is explained to details, referring to an accompanying drawing. In addition, in the drawing, the same sign has shown the same portion. Moreover, although the portion to which an oil repellent agent is applied is shown by the dashed line in the shape of a layer, it does not limit the amount and thickness of an oil repellent agent which should be applied.

[0009] Drawing 1 is the cross section showing the fundamental configuration of the liquid bearing equipment by this invention. the shank material 1 in which this configuration is almost the same as the configuration of the conventional example mentioned above, and liquid bearing equipment 10 was inserted free [ rotation ] to cylinder-like the sleeve member 3 and the sleeve member 3 -- since -- it becomes.

[0010] Moreover, it passes to the inner skin 13 of the sleeve member 3, the radial side dynamic pressure generating slot 17 of a ring bone configuration is established in it, and lubricant is injected into the slot 17. Furthermore, the radial side dynamic pressure generating slot 17 is adjoined, and the taper section 11 to which the path of inner skin 13 becomes large is formed in the release edge inner skin of the sleeve member 3 as it keeps away from the radial side dynamic pressure generating slot 17. This taper section 11 is also filled up with lubricant.

[0011] In case liquid bearing equipment [ like ] 10 is assembled like this, in order to prevent lubrication fluids, such as an oil, leaking from the inside of bearing, an oil repellent agent is applied to the surface of bearing material, and the layer of an oil repellent agent is formed in the surface of bearing material.

[0012] In the 1st example, oil-repellent processing has been performed only to the taper section 11 and the release edge 9 of the peripheral face 15 of a shaft 1 which is the part shown in the dashed line section, and the sleeve member 3. A color coupler or a color of fluorescence etc. is added by the oil repellent agent used.

[0013] If oil-repellent processing is performed using the oil repellent agent by which the color coupler was added, since the portion to which the oil repellent agent was applied can be checked with the naked eye, mistake of pouring an unsettled article at degree production process can be prevented.

[0014] Moreover, mistake of applying the layer of an oil repellent agent to the detailed section of a coated member thickly can be prevented, and the working efficiency of oil-repellent processing improves by leaps and bounds.

[0015] Furthermore, in the oil-repellent art by this invention, the applied portion can check with the naked eye, applying an oil repellent agent.

[0016] Drawing 2 is the cross section showing the liquid bearing equipment 10 by the 2nd example of this invention, and since the element which constitutes liquid bearing equipment 20 is almost the same as drawing 1, it omits explanation.

[0017] A different point from the 1st example is performing oil-repellent processing to the whole surface which includes the taper section 31 of the sleeve member 23, the radial side shaft receiving part 33, and the release edge 29 as the dashed line section's shows, and the peripheral face 25 of a shaft 21 in the 2nd example. Since what is necessary is just to immerse an entire component in an oil repellent agent if it does in this way, spreading becomes easy. A color coupler or a color of fluorescence etc. is added by the oil repellent agent like the 1st example.

[0018] In the 2nd example by the oil-repellent art of this invention, the same effect as the 1st example is acquired.

[0019] Furthermore, since the oil repellent agent is colored also when performing oil-repellent processing into the slot for dynamic pressure generating established in the inner skin of a sleeve, compared with the conventional oil-repellent art, the check of spreading with a naked eye becomes easy.

[0020] In addition, the portion which performs oil-repellent processing in the oil-repellent art by this invention is not limited to the portion which performs oil-repellent processing in the 1st and 2nd examples.

[0021] Moreover, in order to raise the adhesion of an oil-repellent film if needed, it may heat-treat, after

applying an oil repellent agent.

[0022]

[Effect of the Invention] It becomes possible to distinguish the existence, the nonuniformity, and the non-applying section of spreading of an oil repellent agent with the naked eye by adopting the colored oil repellent agent like the oil-repellent art of this invention. Moreover, also when oil-repellent processing to the detailed section of a coated member was performed, the check became easy and the effectiveness of the oil-repellent processing activity for forming the layer of an oil repellent agent improved by leaps and bounds.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the outline cross section showing the liquid bearing equipment with which oil-repellent processing which is the 1st example of the oil-repellent art of this invention was performed.

[Drawing 2] Drawing 2 is the outline cross section showing the liquid bearing equipment with which oil-repellent processing which is the 2nd example of the oil-repellent art of this invention was performed.

[Drawing 3] Drawing 3 is the outline cross section showing the liquid bearing equipment with which oil-repellent processing of the conventional oil-repellent art was performed.

[Description of Notations]

- 1 21 Shaft
- 3 23 Sleeve
- 9 29 Sleeve end face
- 11 31 Taper section
- 17 27 Dynamic pressure generating slot
- 25 Peripheral Face of Shaft

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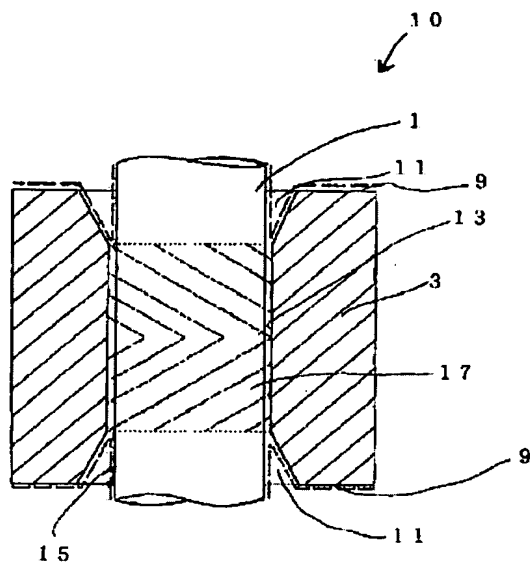
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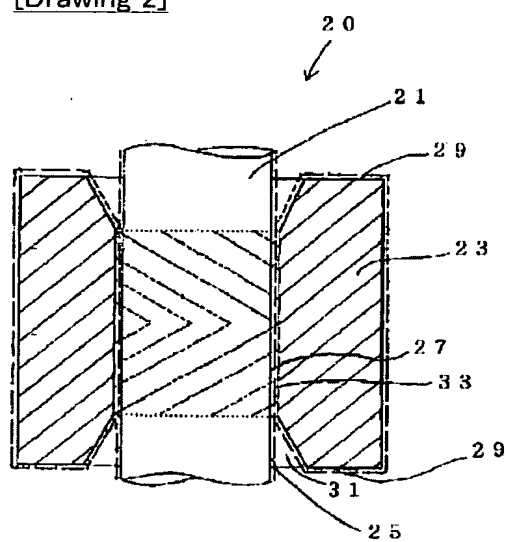
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DRAWINGS

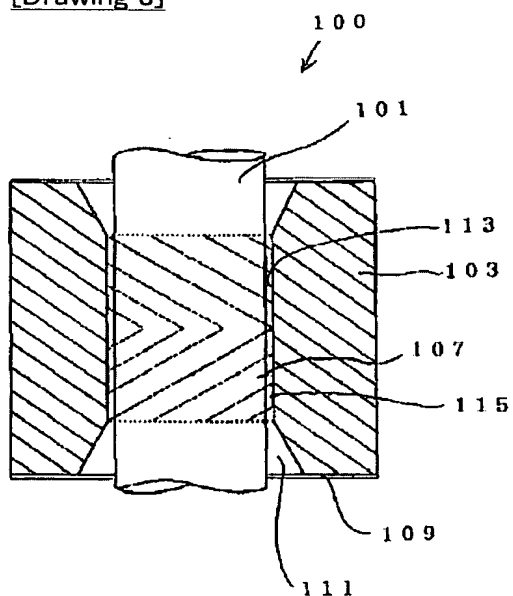
[Drawing 1]



[Drawing 2]



[Drawing 3]



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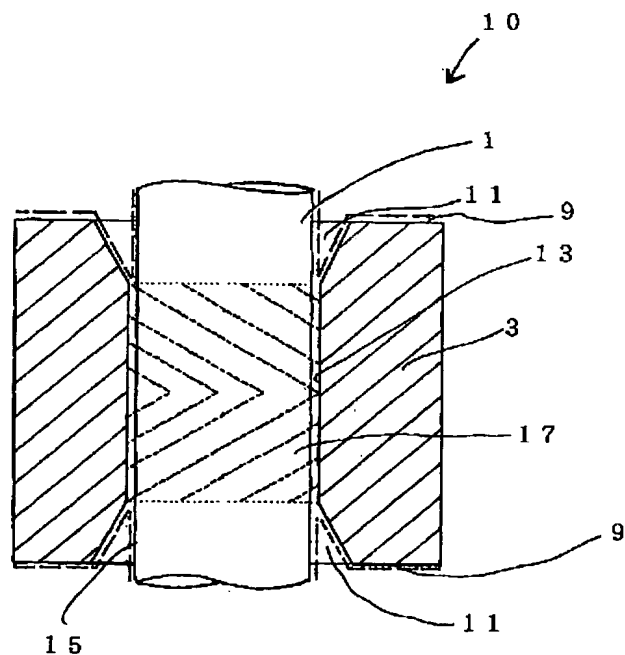
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(54) 【発明の名称】 流体軸受装置の撥油剤の処理方法及びその撥油剤を使用した流体軸受装置

## (57) 【要約】

【課題】 撥油処理を流体軸受装置に行う場合、撥油剤が無色透明であるため、被塗布部材への塗布の有無について肉眼で確認することが困難である。

【解決手段】 流体軸受装置に撥油剤の層を形成する撥油剤の処理方法において、前記撥油剤に発色剤が添加されていることを特徴とする流体軸受装置の撥油剤の処理方法。



**【特許請求の範囲】**

【請求項 1】 流体軸受装置に撥油剤の層を形成する撥油剤の処理方法において、前記撥油剤に発色剤が添加されていることを特徴とする流体軸受装置の撥油剤の処理方法。

【請求項 2】 流体軸受装置において、発色剤を添加した撥油剤の層が形成されている流体軸受装置。

**【発明の詳細な説明】****【0001】**

【発明の属する技術分野】 本発明は流体軸受装置、更に詳しくは情報機器、音響・映像機器用スピンドルモータに用いられる流体軸受装置に関し、特に、軸又はスリーブの少なくとも片方に動圧溝を持つ動圧軸受装置の軸受部において潤滑流体の流出を防止するための撥油処理に関する。

**【0002】**

【従来の技術】 図 3 に示されるように、従来よりスリーブ部材 103 と、スリーブ部材 103 に対して相対的に回転自在である軸部材 101 とを備え、スリーブ部材 103 の内周面および軸部材 101 の外周面のいずれか一方には、ラジアル側動圧発生溝 107 が設けられ、軸部材 101 とスリーブ部材 103 との間の間隙 115 及び動圧発生溝 107 に潤滑流体が充填されている流体軸受装置 100 が使用されている。

【0003】 軸 101 の外周面とスリーブ 103 の内周面とで画成される間隙 115 に充填された油等の潤滑流体が、回転により発生する遠心力等により漏れることを防止する為に、無色透明の撥油剤を使用して撥油処理を施していた。また、撥油処理の工程では、撥油剤を薄くかつ均一に塗布する目的で、通常揮発性の高い希釈剤を用いて撥油剤を希釈した後に、ラジアル軸受部 113 又は、スリーブ部材 103 の端面 109 およびテーパ部 111 といった周辺部に撥油剤が塗布されていた。

**【0004】**

【発明が解決しようとする課題】 しかしながら、従来の撥油処理方法は、つぎのような問題点がある。・塗布してはいけない場所に撥油剤が塗布された場合や、被塗布部材の微細な部分へ塗布する場合に、撥油剤が無色透明であるため、塗布の有無を肉眼で確認することが困難である。・撥油剤が大量に塗布された場合やその撥油剤の液だれ等が生じた場合に、撥油剤が無色透明であるため、被塗布部材のどこまで撥油剤が塗布されたか判別することが困難である。・撥油剤が無色透明である上に、希釈するために通常使用される希釈剤は、揮発性が高く蒸発が早いので、綿棒などで希釈された撥油剤を塗布した場合に、塗布の有無の確認を一層困難にしている。

**【0005】**

【課題を解決する手段】 上記問題点を解決するために、本発明は、流体軸受装置に撥油剤の層を形成する撥油剤の処理方法において、前記撥油剤に発色剤が添加するこ

ととしている。本発明による撥油処理を流体軸受装置に行う場合、塗布された状態を肉眼で確認できる。

**【0006】**

【発明の実施の形態】 本発明は、軸又はスリーブの少なくとも片方に動圧溝を持つ流体軸受装置の軸受部における、潤滑流体の流出を防止するための撥油処理において、発色剤が添加された撥油剤を使用するものである。

【0007】 発色剤としては、蛍光性を有するもの又は染料を含有するものを用いる。なお、蛍光性の材料を混ぜた撥油剤を使用する場合には、紫外線光のもとで塗布作業を行うことが好ましい。

**【0008】**

【実施例】 以下、添付図面を参照しつつ本発明の実施例を詳細に説明する。尚、図面において同一部分は同一符号で示してある。また、撥油剤が塗布される部分は、破線で層状に示されているが、塗布すべき撥油剤の量および厚さを限定するものではない。

【0009】 図 1 は、本発明による流体軸受装置の基本的な構成を示す断面図である。この構成は前述した従来例の構成とほぼ同じであり、流体軸受装置 10 は、円筒状のスリーブ部材 3 と、スリーブ部材 3 に対して回転自在に詰め合わせられた軸部材 1 と、からなる。

【0010】 また、スリーブ部材 3 の内周面 13 には、ヘリングボーン形状のラジアル側動圧発生溝 17 が設けられ、溝 17 には、潤滑剤が注入されている。更に、スリーブ部材 3 の解放端部内周面には、ラジアル側動圧発生溝 17 に隣接して、ラジアル側動圧発生溝 17 から遠ざかるにつれて内周面 13 の径が大きくなるようなテーパ部 11 が設けられている。このテーパ部 11 にも、潤滑剤が充填されている。

【0011】 このような流体軸受装置 10 を組み立てる際、軸受内から油等の潤滑流体が漏れることを防ぐ為に、撥油剤を軸受部材の表面に塗布して、軸受部材の表面に撥油剤の層を形成する。

【0012】 第 1 実施例では、破線部で示した部位である、軸 1 の外周面 15、スリーブ部材 3 のテーパ部 11 及び解放端部 9 のみに、撥油処理を施してある。使用される撥油剤には、蛍光性の発色剤又は染料等が添加されている。

【0013】 発色剤が添加された撥油剤を用いて、撥油処理を行うと、撥油剤が塗布された部分を肉眼で確認できるので、未処理品を次工程に流すといったミスを防止する事が出来る。

【0014】 また、被塗布部材の微細部へ撥油剤の層を厚く塗布してしまうというミスを防止でき、撥油処理の作業効率が飛躍的に向上する。

【0015】 さらに、本発明による撥油処理方法では、撥油剤の塗布を行いながら、塗布された部分が肉眼で確認できる。

【0016】 図 2 は本発明の第 2 実施例による流体軸受



装置 10 を示す断面図であり、流体軸受装置 20 を構成する要素は、図 1 とほぼ同じであるので説明を割愛する。

【0017】第 1 実施例と異なる点は、第 2 実施例において、破線部で示すようにスリーブ部材 23 のテーパ部 31、ラジアル側軸受部 33、解放端部 29 を含む全面及び軸 21 の外周面 25 に、撥油処理を行うことである。このようにすると部品全体を撥油剤に浸漬すればよいので、塗布が簡単となる。第 1 実施例と同様に、撥油剤には蛍光性の発色剤又は染料等が添加されている。

【0018】本発明の撥油処理方法による第 2 実施例では、第 1 実施例と同様の効果が得られる。

【0019】さらに、スリーブの内周面に設けられている動圧発生用溝に撥油処理を行う場合にも、撥油剤が着色されているため、従来の撥油処理方法と比べ、肉眼での塗布の確認が容易となる。

【0020】なお、本発明による撥油処理方法において撥油処理を行う部分は、第 1 及び第 2 実施例において撥油処理を行う部分に限定されるものではない。

【0021】また、必要に応じて撥油膜の密着性を高めるために、撥油剤を塗布した後に加熱処理を行うこともある。

【0022】

【発明の効果】本発明の撥油処理方法のように、着色された撥油剤を採用することによって、撥油剤の塗布の有無やムラ及び非塗布部を肉眼で判別することが可能となる。また、被塗布部材の微細部への撥油処理を行う場合にも、その確認が容易となり、撥油剤の層を形成するための撥油処理作業の効率が飛躍的に向上した。

【図面の簡単な説明】

【図 1】図 1 は、本発明の撥油処理方法の第 1 実施例である撥油処理が行われた流体軸受装置を示す概略断面図である。

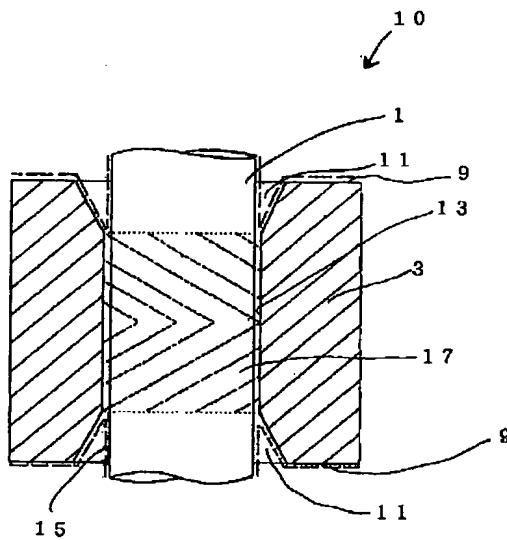
【図 2】図 2 は、本発明の撥油処理方法の第 2 実施例である撥油処理が行われた流体軸受装置を示す概略断面図である。

【図 3】図 3 は、従来の撥油処理方法の撥油処理が行われた流体軸受装置を示す概略断面図である。

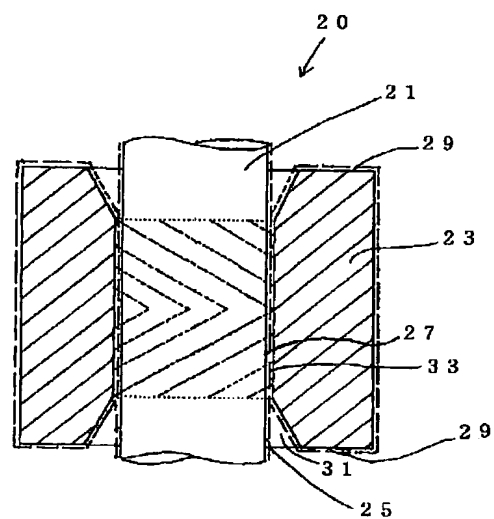
【符号の説明】

1、21	軸
3、23	スリーブ
9、29	スリーブ端部
11、31	テーパ部
17、27	動圧発生溝
25	軸の外周面

【図 1】



【図 2】



【図 3】

